

Efforts Relating to Local Environmental Issues

J-POWER Group recognizes that protecting the local environment, including maintaining biodiversity, and ensuring the safety and preserving the living environment of local residents forms the foundation for harmony with local communities, and therefore strives to function in harmony with the local environment, for example by taking measures to minimize the environmental impact of our operations.

Environmental Measures at Coal-Fired Power Stations

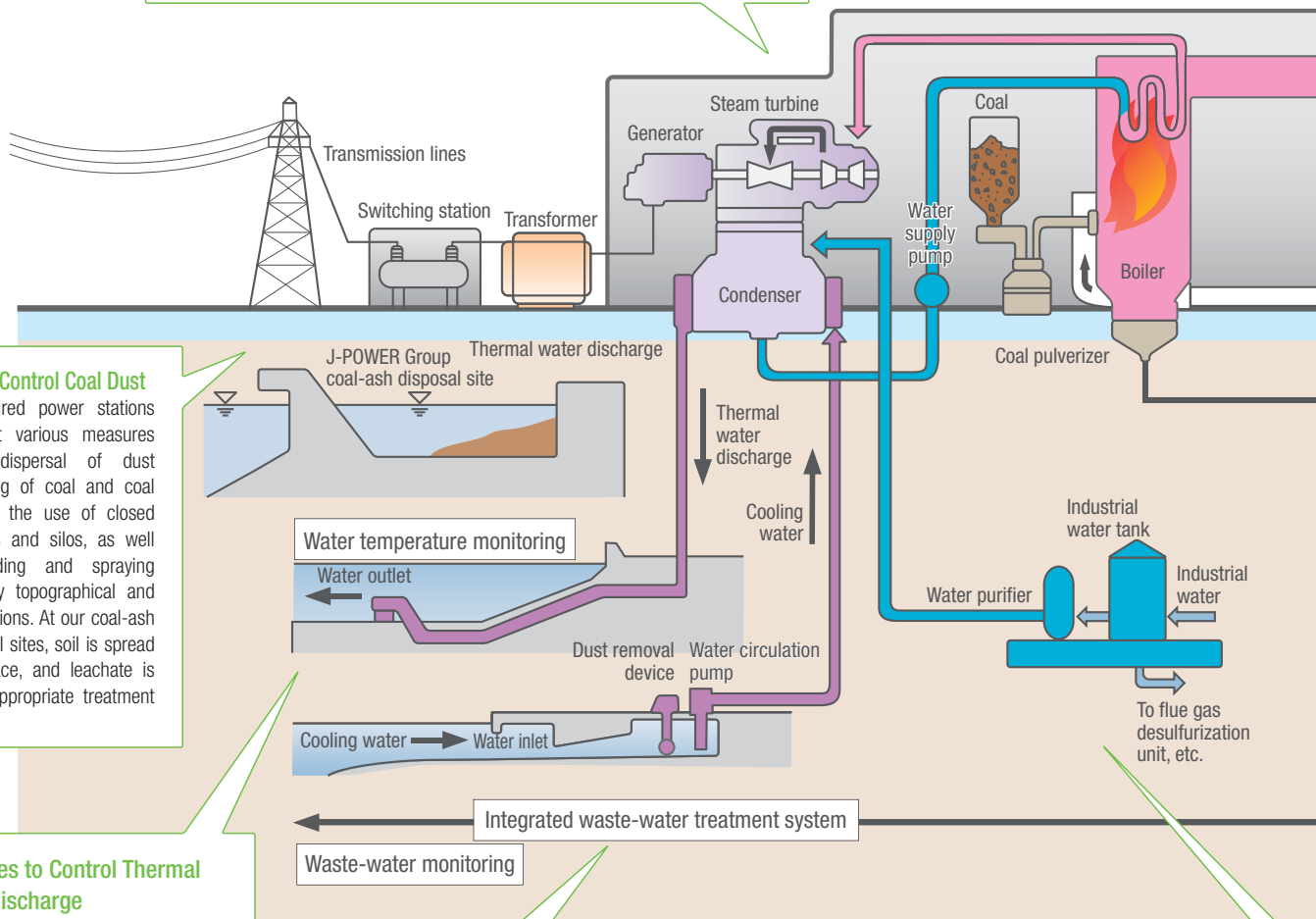
Seeking to minimize impact on the local environment from the operation of our coal-fired power stations, J-POWER Group employs the latest environmental technology and know-how to prevent air and water pollution, noise and vibration, and other harmful effects.

Noise and Vibration Control
 We work to prevent noise and vibration pollution by keeping such noise- and vibration-emitting equipment as boilers, turbines, and exhaust fans inside buildings. For outdoor equipment, we install soundproof covers and sound barriers as needed. Noise and vibration levels are periodically measured at the boundaries of our sites to ensure that they meet regulatory standards.

Measures to Control Coal Dust
 At our coal-fired power stations we implement various measures to prevent dispersal of dust during handling of coal and coal ash, including the use of closed conveyor belts and silos, as well as windshielding and spraying as dictated by topographical and weather conditions. At our coal-ash landfill disposal sites, soil is spread over the surface, and leachate is treated with appropriate treatment systems.

Measures to Control Thermal Water Discharge
 Seawater taken in to cool the steam used in power generation is released as thermal water discharge. We control intake and discharge properly to prevent any negative impact on marine life in the vicinity, and monitor the temperature of thermal water discharge around the clock to ensure that it remains within the limits established by environmental agreements.

Water Pollution Control
 Waste water from such facilities as desulfurization units and offices is appropriately treated in integrated waste-water treatment systems, through coagulation, precipitation, filtration, and so forth. Treated water is routinely monitored by automatic measuring equipment and analyzed periodically to ensure that it meets the standards set under the Water Pollution Control Law and environmental conservation agreements.



Odor Control

Ammonia is used in such equipment as our flue-gas denitrification systems, and we are careful to prevent its leakage from equipment for handling it and facilities for receiving and storing it through routine inspections and other measures. Odor levels are periodically measured at the boundaries of our sites to confirm that they meet regulatory standards.

Air Pollution Control

Combustion of coal and other fuels can generate sulfur oxides (SO_x), nitrogen oxides (NO_x), and soot and dust. To reduce these emissions we have improved our combustion methods and installed such flue-gas treatment equipment as desulfurization and denitrification systems and electrostatic precipitators. Although the performance of equipment varies with its date of installation, at each facility we have installed the newest technology available at the time to remove pollutants with maximum efficiency. This equipment operates automatically with the aid of monitoring devices that continuously measure the content of flue gas. In addition, human operators monitor the equipment 24 hours a day to ensure a swift response in the event of any malfunction.

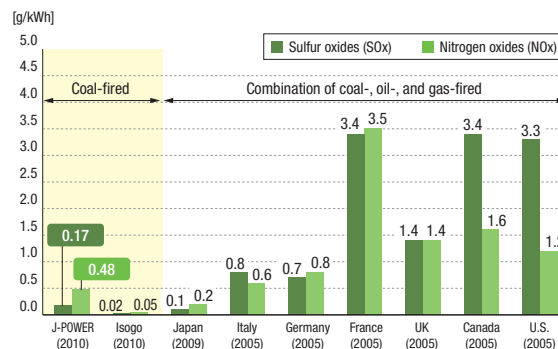
Flue-gas Emissions, FY 2010

Substance	Equipment efficiency (removal efficiency)	Emissions	Emissions intensity
SO _x	64–99%	10,100 tons	0.17g/kWh
NO _x	72–94%	28,000 tons	0.48g/kWh
Soot and dust	99% (as designed)	800 tons	0.01g/kWh

Notes:

1. Emissions intensity: Emissions per unit of electricity generated at thermal power stations.
2. Emissions of soot and dust are calculated on the basis of measurements taken monthly.

International Comparison of SO_x and NO_x Emissions Intensity for Thermal Generation



Notes:

1. Formulated by J-POWER based on data from the Federation of Electric Power Companies of Japan. Data for Japan represents 10 electric utilities and J-POWER.
2. Emissions intensity for coal-fired generation is shown for J-POWER and Isogo.
3. Other than for J-POWER and Isogo, emissions intensity for a combination of coal-, oil-, and gas-fired generation is shown.
4. "Isogo" refers to J-POWER's Isogo Thermal Power Station.

High chimney stack

Flue gas measurement equipment

Flue gas monitoring television

Exhaust gas

Air

Electrostatic precipitator
Flue-gas desulfurization system
Flue-gas denitrification system

Forced ventilator

Coal ash

Gypsum

Waste recycling (see p. 71)

Greening

We supply our sites with greenery by planting trees and shrubs, primarily evergreens.

Cutting Back on Industrial Water Use

Industrial water is used in such equipment as boilers, cooling systems, and wet-type desulfurization systems, and almost all of it is released into the atmosphere as steam. We are working to reduce our consumption of industrial water through the recovery and reuse of rainwater and waste water that is not released into the atmosphere.

Measures to Prevent Soil Pollution

From FY 2004 through FY 2006, we conducted studies at all J-POWER Group domestic sites and determined that they were free of soil or groundwater contamination. We will continue working diligently to prevent soil and groundwater pollution.

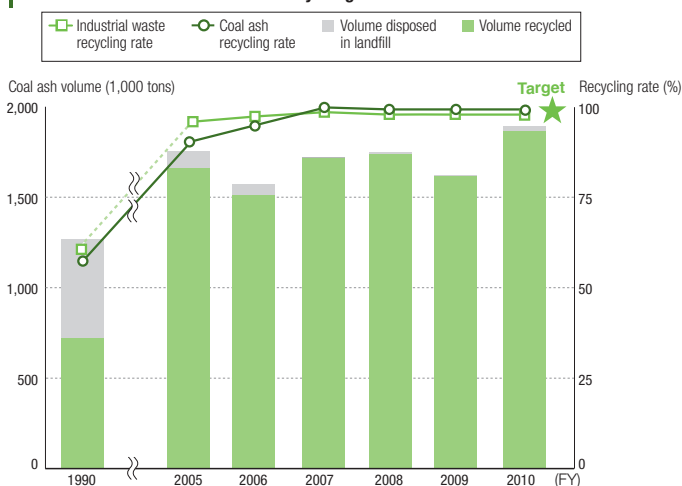
Establishing a Sound Material-Cycle Society

To help establish a sound material-cycle society, J-POWER Group is working hard to reduce the waste we generate and to properly treat and recycle the waste we do produce. We are also pursuing business undertakings that build on these practices.

Recycling and Reduction of Waste

In FY 2010, J-POWER Group generated 2.34 million tons of industrial waste, while recycling or reusing resources totaling 2.26 million tons, or 97%. We intend to promote more extensive recycling of coal ash and further reduce the industrial waste produced by the maintenance and operation of power stations and other business activities to achieve a recycling rate of 97% within J-POWER Group as a whole from FY 2011 onwards, with the goal of achieving zero emissions^{*1} of industrial waste (see p. 46, 84).

Industrial Waste and Coal Ash Recycling Rates



Note: The figure for FY 1990 represents J-POWER's recycling rate for coal ash only; figures from FY 2005 onwards and target figures represent the effective recycling rate for all industrial waste produced by all companies of J-POWER Group.

Beneficial Use of Coal Ash and Gypsum

Almost all the coal ash generated by coal-fired power stations is recycled, either as construction material such as a clay substitute in cement and

backfill and landscaping material or farming and forestry supplies such as fertilizers (see p. 86). All of the gypsum and sulfuric acid generated by our flue-gas desulfurization systems is recycled.

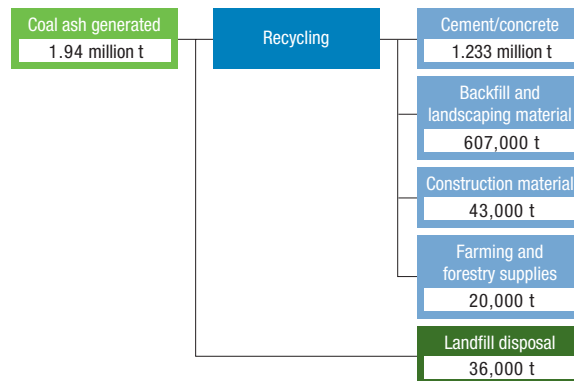
Examples of Coal Ash Recycling

We employed fly ash mortar^{*2} for surface lining of controlled landfill sites for disposal of coal ash, enabling us to increase our rate of recycling of coal ash.



Surface lining of industrial waste landfill site using fly ash mortar (J-POWER Hibikinada Waste Disposal Site No. 3, Kita-Kyushu)

Breakdown of Coal Ash Recycling

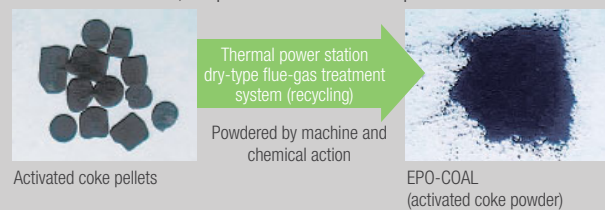


EPO-COAL: Activated Coke Powder for Dioxin Removal

J-POWER Group's powdered dioxin remover EPO-COAL for waste incinerators is a commercial product made from activated coke powder discharged from the dry-type flue gas denitrification units of coal-fired power stations. It is highly regarded by users and equipment manufacturers for its stability of performance, quality and price.

The purpose of J-POWER Group's involvement in this business is not only to reduce waste and raise our recycling rate but also to contribute to the creation of a material-cycle society. We also regard it as integral to our efforts to stem global warming, since recycling can reduce the CO₂ emissions

that result from production of the activated coke commonly available on the market. As a member of a society that is striving for harmonious coexistence with the environment, we plan to continue such operations.



References

^{*1} Zero emissions
An initiative advocated by United Nations University to build a system of waste recycling through inter-industry partnerships and reduce the amount of waste (final disposal volume) to a level approaching zero.

^{*2} Fly ash mortar
A hard substance created by adding a small quantity of cement to coal ash and mixing it with seawater. Combines a high degree of waterproofing ability with strength for use in construction.

Recycling of Construction By-products

We work with subcontractors and others to promote efficient use of byproducts generated by new construction, expansion, and renovation of electric power facilities, as by recycling concrete scrap and cleared timber or making use of loose earth generated during construction within the grounds of the facility.

Making Effective Use of Driftwood from Dam Reservoirs

In J-POWER Group, we are working to effectively recycle the driftwood that flows into the dam reservoirs at our hydropower stations. We put the recovered driftwood to a wide variety of uses, including producing charcoal and extracting pyrolygneous acid, in addition to chipping it for use as mulch, boiler fuel, and compost.



Wood chips produced from driftwood



Chips used as ground cover at Ikehara Dam Park (Nara Prefecture)



Activities during 3Rs Promotion Month (J-POWER Headquarters)

Reducing and Recycling Office Waste

All J-POWER Group offices are working to reduce nonindustrial waste by such measures as sorting waste paper, bottles, cans, and plastics; using both sides of copier paper; and reusing envelopes.

With regard to our paper recycling rate, we have been working towards the achievement of our Group-wide Corporate Targets (see p. 49) with increased awareness on the part of our employees, enabling us to successfully meet the targets that we had set up to the end of 2010. We are also promoting the 3Rs in relation to nonindustrial office waste, for example by reducing and thoroughly sorting waste and expanding the scope of items that we reuse.

Promoting Green Purchasing

To contribute to the development of a material-cycle society, we have adopted the J-POWER Group Green Purchasing Guidelines to promote green purchasing throughout J-POWER Group.

These guidelines apply not only to office supplies but to all products and services purchased by members of J-POWER Group. We are pursuing a wide-ranging policy that encourages environmental responsibility among our suppliers and subcontractors, as by stipulating specifications that must be built into construction and other contracts to ensure that subcontractors carry out the work in an environmentally friendly manner.

In addition, we are promoting green purchasing on an ongoing basis by establishing Group-wide Corporate Targets (see p. 49) for our rate of green purchasing of office supplies (stationery) and our rate of purchasing of recycled copy paper, as well as the ratio of low-emission and other non-polluting vehicles among Group company vehicles. We successfully met the targets that we set for the end of 2010.

 http://www.jpowers.co.jp/company_info/environment/kankyo04gl.html (Japanese only)

3Rs*¹ Promotion Month

We took advantage of the fact that October was 3Rs Promotion Month to conduct activities such as introducing examples of our 3R-related initiatives (J-POWER Headquarters). By means of explaining what we do with the coal ash produced by our business and the driftwood found in our reservoirs, in addition to discussing 3R activities that can be undertaken at home, we sought to increase our employees' understanding of the 3Rs and to increase their awareness of how to put the concepts into action.

References

*1 The 3Rs

The 3Rs are the first letters of the following three words that express the concept of reducing the amount of waste produced and building a recycling-oriented society:

1) Reduce: Curb the amount of waste produced 2) Reuse 3) Recycle: Treat as a recyclable resource

Preserving Biodiversity

In all its business activities, J-POWER Group considers potential impact on biodiversity and strives to achieve harmonious coexistence with the natural environment. When building a new power station or other facility, we carry out environmental impact assessments and adopt appropriate environmental safeguards with the views of local residents in mind. In addition, we carefully monitor outcomes as we pursue environmental policies oriented to harmonious coexistence with nature.

Steps to Preserve Biodiversity

Blakiston's Fish-owl, Tokachi District, Hokkaido Prefecture

The Tokachi district of Hokkaido is home to Blakiston's Fish Owl, classified as Critically Endangered IA in the Japanese Environment Ministry's Red Data Book (Critically Endangered in Hokkaido). As part of its environmental protection activities, J-POWER Group is taking care not to have any impact on the breeding of the owls, for example by scheduling work in the area for periods other than the nesting season.



Blakiston's fish-owl (photo: Kushiro Zoo)

Japanese Golden Eagle, Okutadami-Otori Area

The area around Okutadami Dam and Otori Dam (Fukushima Prefecture, Niigata Prefecture) is home to the Japanese golden eagle, ranked as "endangered IB" in the Environment Ministry's Red Data Book. J-POWER Group is helping protect the eagles by avoiding outdoor work on these dams during the eagle's nesting season. If work needs to be carried out in the vicinity, we determine the status of nesting activity, seek the advice of ornithological experts, and take precautions to reduce vehicle traffic and noise level so as to minimize the impact on nesting activity.



Japanese Golden Eagle chicks

Voice | Assisting in Environmental Protection Activities

Environmental Education Program

— A Power Station brimming with Butterflies —

We have been conducting this program for students of local elementary schools and their parents at the Ishikawa Coal Thermal Power Station since FY 2008. The grounds of the power station provide a habitat for a wide variety of plants, animals and birds such as Kingfishers, and we make use of this characteristic to offer the opportunity for our visitors to experience nature with all their senses, under the theme "Let's Learn about Nature in Our Local Area."

In addition, more than 20 species of butterfly often seen in Okinawa can be found in the grounds of the station, and so under the theme "Let's Learn about Local Butterflies," we give children the chance to observe their process of development and learn about the plants that they eat, with a particular focus on the Rice Paper Butterfly, Japan's largest with a wingspan of approximately 15 cm, and also the symbol of Uruma City, where the station is located.

Even children with no interest in living creatures run around shouting happily, trying to be the first to discover something. Taking encouragement from comments such as "It was fun learning about different animals" and "There's a lot of nature at a power station!", we will continue to work to introduce the environmental protection activities we conduct at our power stations, spreading the joy of learning.



Shinobu Yamashiro, Operating Group, JPec Co., Ltd., Ishikawa Company



Rice Paper Butterfly



Releasing Rice Paper Butterflies (Ishikawa Coal Thermal Power Station/Okinawa Prefecture)

Harmony with the Aquatic Environment

River Maintenance Discharge

At hydropower stations with dams and conduit-type hydropower stations, the river water taken in upstream from the dam is conducted to the station (positioned downstream from the dam) via a conduit, and this results in a decline in the rate of flow between the dam and the point of discharge of the water back into the river following the generation of power. Because of this, we work to maintain the rate of flow by carrying out river maintenance discharges in consultation with the Ministry of Land, Infrastructure, Transport, and Tourism and other relevant agencies, by releasing an appropriate amount of stored water from the dam. In conducting these river maintenance flow discharges, we are contributing to the maintenance of the river channel and considering the environment by benefiting fish and other aquatic creatures and riverine ecosystems downstream from the dam.



River maintenance discharge (Komori Dam, Mie Prefecture)

Restoration of Wetlands

Plans connected with the Okutadami-Otori Hydro Power Expansion Project called for excavated rock to be used as landfill on the left bank of the river downstream from the Okutadami Dam. Because the area was home to a mountain ecosystem that depends on a wetland environment, we conserved the wetland ecosystem while proceeding with the landfill by creating a new wetland to take the place of the old. We gave scrupulous attention to conducting this work, for example through careful transplantation of flora for the restoration of the wetland, and allowing the old and new wetlands to exist together for as long as possible to encourage dragonflies and other wildlife to migrate naturally. In FY 2005, these efforts were recognized and awarded the Japan Society of Civil Engineers Environment Award. Since then, our surveys have confirmed the continuing presence of rare dragonfly species in the area.



Restored wetlands, Okutadami Power Station

Water Quality of Dam Reservoirs

Typhoons and torrential rains can cause the water in rivers to become muddy, and dam reservoirs, because of their inherent function, tend to retain this muddy water. When this happens, the release of water from the dam reservoir for power generation purposes can prolong the turbidity in the river. In J-POWER Group, we monitor the water quality of our dam reservoirs by installing turbidimeters and performing water quality analyses on water samples. We also monitor the status of turbidity during periods of heavy runoff to enable us to take appropriate countermeasures, for example by dispersing the turbidity at an early stage by means of dam discharges, using surface water intake equipment to prioritize the use of comparatively less turbid surface water for power generation, and using clear water bypass equipment to enable clear water from upstream of the dam to be directly discharged downstream without being stored in the reservoir. In areas where turbidity is severe, we are taking preventive measures by working with the national and prefectural governments in initiatives such as forest management and afforestation programs.



Surface-water intake equipment (Ikehara Dam, Nara Prefecture)



Dredger (Sakuma Dam Shizuoka and Nagano Prefectures)

Measures to Prevent Sediment Buildup in Dams

Each year large quantities of earth flow into dam reservoirs from upstream, and a portion of it builds up as sediment at the bottom of the reservoir. Over a long period, this can cause the level of the river bottom to rise, decrease the storage capacity, making it necessary to take measures to prevent the volume of water in the reservoir from falling or runoff causing flooding around the reservoir or upstream. J-POWER Group therefore controls sediment by dredging and removing it or transporting it to another part of the reservoir.

COLUMN

Management of Chemical Substances

Storage and management of chemical substances in J-POWER Group is rigorous and in full compliance with the law. With regard to PCBs, we are following detoxification treatment procedures in conformance with Japan's regional waste treatment program.

Pollutant Release and Transfer Register (PRTR) Law

The PRTR system is a mechanism for reporting and disclosing the level of chemical emissions and the transfer of chemicals to the environment through waste materials. The legislation was enacted in 1999, and monitoring and reporting of the targeted substances began in FY 2001.

While J-POWER Group uses chemical substances for painting and coating, treatment of intake water at thermal power stations, and other purposes, we have traditionally managed these substances carefully by monitoring and recording the quantities purchased and used. We are committed to reducing the use of such chemicals and to controlling and managing those we use appropriately, complying with all established procedures. With respect to dioxins, we are working hard to reduce emissions through proper management and oversight of facilities.

PRTR Substance Release and Transfer Volumes (FY 2010)

Substance	Use	Volume handled	Volume released	Volume transferred as waste
71 : Ferric chloride	Wastewater treatment agents	10.36 t/y	—	10,360 kg/y
80 : Xylene	Coating for machinery	1.57 t/y	1,556 kg/y	—
243 : Dioxins	Waste incinerators	—	—	330 mg-TEQ/y
321 : Vanadium compounds	Catalysts	1.49 t/y	—	1,493 kg/y
333 : Hydrazine	Boiler water treatment agents	1.94 t/y	0.01 kg/y	—
405 : Boron compounds	Manure additives	12.19 t/y	0.01 kg/y	—

Notes:

- Figures represent total release and transfer volumes for all business sites handling 1 ton or more per year of a Class 1 designated chemical substance or 0.5 ton or more per year of a Specific Class 1 designated chemical substance.
- For dioxins, figures represent total emissions from waste incinerators.

temperature control. In compliance with the above-mentioned act, the dioxin concentration in the flue gas of these facilities is measured at least once a year and reported to the local government, and in FY 2010, all of them met emissions standards.

Asbestos

J-POWER Group has adopted an asbestos policy, under which we have conducted health checks and surveys of asbestos use in our equipment and buildings and undertaken appropriate countermeasures.

Where we have confirmed the presence of asbestos, we are systematically removing it and switching to alternatives while effectively managing the process to prevent dispersal of asbestos dust. Asbestos-containing material that has been removed is disposed of in a manner consistent with the Waste Management and Public Cleansing Act.

PCB Waste

Management and Treatment of PCBs

PCBs have been widely used for insulating oil in transformers and other electric devices because of their excellent heat-resistance and insulation properties. Because of their toxicity, however, manufacture and import were outlawed in 1974, and all those in possession of such substances were required to observe stringent storage and management requirements. In July 2001, the Act on Special Measures against PCB Waste came into force, and proper treatment of waste containing PCBs became mandatory.

J-POWER Group began treatment of these substances under the regional waste treatment program in February 2005, and as of March 2011 we had treated approximately 27 kl of insulating oil (containing high concentrations of PCBs). J-POWER Group currently has approximately 109 kl of insulating oil (as of March 2011). This is stored and managed under stringent conditions in 31 warehouses and similar facilities that we have established nationwide.

Trace PCB Contamination

Concerns have been raised by the detection of extremely low levels of PCBs in heavy electrical machinery that would not ordinarily contain PCBs. In J-POWER Group, we are conducting analyses as needed, following stringent management procedures for machinery using insulating oil in which traces of PCBs have been detected, and submitting all paperwork required by the relevant laws and regulations. We will continue to respond to this issue in a conscientious and appropriate manner.

Measures to Reduce Dioxins

J-POWER Group operates incinerators (designated as "specified facilities" under the Act on Special Measures against Dioxins) at three business sites. At these specified facilities we follow appropriate maintenance and management procedures, such as sorting prior to treatment and combustion